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MONTHLY NOTICES

OF THE

ROYAL ASTRONOMICAL SOCIETY.

VOL. LXIX. DECEMBER 11, 1908. No. 2

H. F. NEWALL, Esq., M.A., F.R.S., PRESIDENT, in the Chair.

The Rev. Thomas Nicklin, M.A., Bescott, Rossall Beach, Fleetwood, Lancashire,

was balloted for and duly elected a Fellow of the Society.

The following candidates were proposed for election as Fellows of the Society, the names of the proposers from personal knowledge being appended :—

Samuel Ernest Loxton, Solicitor, Cannock, Stafford (proposed by W. H. Robinson);
John Mastin, F.L.S., F.C.S., etc., Woodleigh House, Totley Brook, near Sheffield (proposed by G. W. Nicolls);
Philibert J. Melotte, Royal Observatory, Greenwich, S.E. (proposed by Sir W. H. M. Christie); and
Arthur James Potts, Optician, 36 Pentland Road, Edgbaston, Birmingham (proposed by W. H. Robinson).

Seventy-three presents were announced as having been received since the last meeting, including, amongst others :—

Prof. Th. Albrecht, Formeln und Hilfstafeln für Geographische Ortsbestimmung, presented by the author; F. A. Bellamy, Historical Account of the Ashmolean Natural History Society of Oxfordshire, presented by the author; Coordinadas geograficas en la zona de totalidad del Eclipse de Sol, Aug. 1905, presented by Fr. Cortie; Sir G. H. Darwin, Collected Scientific Papers, vol. 2, Tidal Friction and Cosmogony, presented by the author; Prof. J.

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Larmor, Aether and Matter (Adams Prize Essay), presented by Mr. Newall; International Union for Solar Research, Transactions, vol. 2, presented by the publishers; John Tebbutt, Astronomical Memoirs, presented by the author; Photographs of Comet *c* 1908, further series of 15 transparencies, presented by the Astronomer Royal; Photographs of the Moon, etc., taken with a cœlostat reflector, presented by Mr. J. H. Reynolds.

The Relations between Position Angle and Distance and Standard (photographic) Coordinates. By H. C. Plummer, M.A.

1. There is reason to believe that some micrometrical observers recognise some advantage in comparing photographic results with their own differential measures, but are deterred partly by a supposed difficulty in reducing the photographic measures as they appear, for example, in the Astrographic Catalogues, and partly by a distrust in the accuracy of photographic work. It may be well, therefore, to examine what is involved in a careful reduction, and to give a fully-worked example. The value of the photographic catalogues for the purpose has been pointed out, with a number of illustrative results, by Mr. Innes, in a review of Burnham's General Catalogue of Double Stars (*The Observatory*, xxx. p. 452).

2. Let (ξ, η), (ξ_1, η_1) be the standard coordinates of the principal star and companion respectively on a plate whose centre is at R.A. A and decl. D, the focal length being for the present taken as unity. Let the position-angle and distance be p and s. It will be convenient to put

$$N^2 = 1 + \xi^2 + \eta^2 \,; \quad N_1^2 = 1 + \xi_1^2 + \eta_1^2 \quad . \quad . \quad (1)$$

$$\Delta\xi = \xi_1 - \xi, \qquad \Delta\eta = \eta_1 - \eta \quad . \quad . \quad . \quad (2)$$

Then, since $(\xi, \eta, 1)$ and $(\xi_1, \eta_1, 1)$ are proportional to the direction-cosines of lines drawn in the direction of the two stars, we have at once

$$\cos s = (\xi\xi_1 + \eta\eta_1 + 1)/NN_1 \quad . \quad . \quad . \quad (3)$$

which gives

$$\sin^2 s = \{\Delta\xi^2 + \Delta\eta^2 + (\eta\Delta\xi - \xi\Delta\eta)^2\}/N^2N_1^2 \,. \quad . \quad (4)$$

Now, on an astrographic plate, ξ and η can scarcely exceed $\frac{1}{60}$, and are usually much less. Hence, if we wish to measure distances up to 300″ and allow an error of 0″·1 in extreme cases on such plates, we can put simply

$$s = (\Delta\xi^2 + \Delta\eta^2)^{\frac{1}{2}} \quad . \quad . \quad . \quad . \quad (5)$$

On larger plates it may be necessary to use a closer approximation.

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